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SUPPLEMENTARY REPORT ON SEWER AIR.

W. H. BRADLEY, ESQ., *Superintendent of Sewers*:—

DEAR SIR: In a Report which I had the honor of presenting to you on December 1, 1878, with reference to the condition of the air in the Berkeley Street sewer, it appeared that the average amount of carbonic acid in the sewer was smaller during the months of January and February, than during other months of the year when observations were made. At the same time it will be remembered that from the 17th of January through February and until March 9, the sewer was, by pumping, kept in a better condition than usual, in the condition, indeed, in which it will be kept when the intercepting system is completed; the sewage flowed constantly, and was never more than a few inches in depth except during storms.

It appeared then from the examinations made, that the condition of the air was better while the pumping was going on than it was subsequently, but to assert that the cause was due to the condition of the sewer seemed unwarrantable, until other examinations could be made during the winter months. I am now in position to report such results which seem to justify the statement that the amount of carbonic acid in the sewer air was lessened somewhat by keeping up the constant flow in sewer. The average amount of carbonic acid in the air at various times was as follows:—the average of

31	determinations in January 1878,	was	8.7	vols	of carbonic acid in 10,000 vols. of air.
41	"	February	"	8.2	" " "
47	"	March	"	11.5	" " "
12	"	April	"	10.7	" " "
8	"	June	"	27.5	" " "
8	"	July	"	21.9	" " "
6	"	August	"	23.9	" " "
7	"	January 1879	"	8.0	" " "
14	"	February	"	11.6	" " "
20	"	March	"	11.8	" " "

The results may also be compared in this way: the average of

90	determinations from Jan. 17 to Mar. 9, 1878, during pumping,	was	8.5	vols. carbonic acid.
25	"	from Jan. 17, to Mar. 9, 1879, without pumping,	" 10.4	" " "

The details of the more recent examinations are as follows:—

Table IV. — Continued.

No.	Date. 1879.	Hour.	Hours be- fore or af- ter high tide	Carb. Acid.	Height of Barometer.
1	January 17	3.30 P.M.	— 3	9.7	30.50
2	" 18	3.00 P.M.	— 4 $\frac{3}{4}$	11.2	29.91
3	" 21	2.30 P.M.	+ 4 $\frac{1}{2}$	6.6	30.20
4	" 22	10.00 A.M.	— 1 $\frac{1}{2}$	8.0	30.19
5	" 24	12.15 P.M.	0	8.1	30.56
6	" 27	9.00 A.M.	— 5 $\frac{1}{2}$	5.6	30.38
7	" 27	2.15 P.M.	— $\frac{3}{4}$	7.1	30.12
8	February 1	9.45 A.M.	+ 3 $\frac{1}{2}$	8.1	29.76
9	" 3	9.00 A.M.	+ $\frac{1}{2}$	7.8	29.86
10	" 13	10.00 A.M.	\pm 6	9.6	29.94
11	" 14	2.40 P.M.	— 2 $\frac{1}{2}$	10.7	30.23
12	" 15	9.15 A.M.	+ 2 $\frac{3}{4}$	10.7	30.51
13	" 17	3.00 P.M.	\pm 6	18.4	30.52
14	" 18	9.40 A.M.	0	15.5	30.26
15	" 19	2.15 P.M.	+ 3 $\frac{3}{4}$	15.0	30.56
16	" 20	9.00 A.M.	— 2 $\frac{1}{4}$	16.8	30.17
17	" 21	2.30 P.M.	+ 2 $\frac{3}{4}$	11.1	29.92
18	" 22	9.30 A.M.	— 2 $\frac{1}{2}$	9.6	30.08
19	" 25	2.00 P.M.	0	9.6	30.31
20	" 27	1.20 P.M.	— 1	9.2	30.46
21	" 28	2.30 P.M.	— 1 $\frac{1}{4}$	10.1	30.89
22	March 3	4.00 P.M.	— 3	14.9	30.01
23	" 6	4.40 P.M.	— 5 $\frac{1}{4}$	8.8	30.45
24	" 7	10.00 A.M.	— $\frac{3}{4}$	8.4	30.26
25	" 8	11.25 A.M.	0	8.6	30.62
26	" 10	2.40 P.M.	+ 1 $\frac{1}{4}$	13.0	30.40
27	" 11	2.35 P.M.	+ 1 $\frac{1}{4}$	12.7	30.10
28	" 12	3.10 P.M.	+ 1	19.6	30.42
29	" 13	3.25 P.M.	+ $\frac{1}{2}$	8.5	30.09
30	" 14	3.00 P.M.	— 1	10.6	29.97
31	" 15	10.20 A.M.	+ 5 $\frac{1}{4}$	8.9	30.02
32	" 17	2.55 P.M.	— 4 $\frac{1}{2}$	14.7	29.93
33	" 18	3.20 P.M.	— 5	8.7	30.24
34	" 19	2.45 P.M.	+ 5 $\frac{1}{2}$	9.1	30.30
35	" 20	2.45 P.M.	+ 4 $\frac{3}{4}$	15.3	30.35
36	" 21	3.15 P.M.	+ 4 $\frac{3}{4}$	13.7	30.12
37	" 22	2.55 P.M.	+ 3 $\frac{1}{2}$	10.1	30.42
38	" 24	3.05 P.M.	+ 3	11.4	30.25
39	" 25	3.15 P.M.	+ 2 $\frac{1}{2}$	16.8	30.13
40	" 28	3.00 P.M.	+ $\frac{1}{4}$	6.8	30.34
41	" 29	12.00 M.	+ 3 $\frac{1}{2}$	12.1	29.98

Inspection of the foregoing table will show, that, as in previous months, the amount of carbonic acid is subject to considerable and sudden variation. Table IV (in the former report) shows some cases where the morning and afternoon specimens proved nearly identical, while on other days there was an enormous rise or fall. It is then only from a large number of examinations that we can deduce an instructive average.

It is to be said that, after all, the difference between 8.5 and 10.4 is not very great, and would hardly furnish an argument for the new system of sewerage, at least as far as sewers of this size are concerned; moreover, a part at any rate of this difference is, no doubt, due to the fact that a man-hole cover was removed for the insertion of the suction pipe of the pump and thus the amount of ventilation was increased.

I may say further, that I was not able to present last year a satisfactory record of the variations of temperature to which the sewer is subject; observations are, however, being made the present year: the results thus far recorded appear in the following table. The thermometers, a maximum, a minimum, and an ordinary thermometer, are suspended in the sewer at the point whence the samples of air are taken. The thermometers are read once a week. No very great accuracy is aimed at and, indeed, the presence of two men with a lantern in a six-foot sewer causes a slight elevation of temperature, even during the reading. The figures in column A are substantially accurate; the readings are taken with a Centigrade thermometer and are reduced to Fahrenheit degrees in column A'. The readings in columns B' and C' are made with rather small Fahrenheit thermometers, and taking into account the difficulties of the situation no attempt is made to read nearer than half a degree, and the error in some cases may be as great as three-quarters of a degree Fahr., or even of one degree. Columns B and C are calculated from B' and C'.

Yours respectfully,

WM. RIPLEY NICHOLS.

Boston, April 1, 1879.

Observations on the Temperature in the Berkeley Street Sewer.

Expressed in Degrees
Centigrade. Fahrenheit.

Date.	A. Temp.	B. Max.	C. Min.	Diff.	A. Temp.	B. Max.	C. Min.	Diff.
January 11 4	9.8	.			49.5			
Jan. 4 - Jan. 11		15.5	9.1	6.4		60.0	48.5	11.5
January 11	10.5				51.0			
Jan. 11 - Jan. 18		10.0	8.9	1.1		50.0	48.0	2.0
January 18	10.3				50.5			
Jan. 18 - Jan. 25		13.0	8.9	4.1		55.5	48.0	7.5
January 25	9.8				49.5			
Jan. 25 - Feb. 1		11.9	6.1	5.8		53.5	43.0	10.5
February 1	8.5				47.5			
Feb. 1 - Feb. 7		12.5	7.8	4.7		54.5	46.0	8.5
February 7	10.3				50.5			
Feb. 7 - Feb. 15		11.7	2.8	8.9		53.0	37.0	16.0
February 15	8.0				46.5			
Feb. 15 - Feb. 22		12.5	6.7	5.8		54.5	44.0	10.5
February 22	8.8				48.0			
Feb. 22 - Mch. 1		12.5	3.0	9.5		54.5	37.5	17.0
March 1	7.3				45.0			
Mch. 1 - Mch. 8		7.8	5.5	2.3		46.0	42.0	4.0
March 8	8.5				47.5			
Mch. 8 - Mch. 15		7.0	6.7	0.3		44.5	41.0	0.5
March 15	7.8				46.0			
Mch. 15 - Mch. 22		10.0	6.1	3.9		50.0	43.0	7.0
March 22	7.8				46.0			
Mch. 22 - Mch. 29		11.9	4.4	7.5		53.5	40.0	13.5
March 29	7.5				45.5			
Mch. 29 - April 7		7.0	5.3	1.7		44.5	41.5	3.0
April 7	7.7				46.0			
April 7 - April 12		7.2	4.7	2.5		45.0	40.5	4.5
April 12	7.3				45.0			

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